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THE ENTOMOLOGICAL SOCIETY OF LONDON

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1930.—Transactions, Vol. LXXVIII: Part I, £1 10*s.* 0*d.*, to Fellows, £1 2*s.* 6*d.*; Part II, £2 2*s.* 0*d.*, to Fellows, £1 11*s.* 6*d.*
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1932.—Vol. 1, £1 16*s.* 0*d.*; to Fellows, £1 7*s.* 0*d.*

1933.—Vol. 2, subscription rate £1 4*s.* 0*d.*, to Fellows, 16*s.* 0*d.*; monthly parts 3*s.* 0*d.* each to Fellows, 2*s.* 0*d.*

A note on the scent-scales of the Pierine genera *Delias, Daptonura*, and *Belenois*.

Dr. F. A. Dixey exhibited some specimens of the above-mentioned genera, together with sketches and slides of their scent-scales, shown on the screen. He said : " there seems to be an impression that in *Delias*, plume-scales occur only on the fore-wing. I cannot answer for all the numerous species of the genus, but in three representative species, viz., *D. aganippe*, Donov., *D. eucharis*, Drury, and *D. aglaia*, Linn., there is no doubt that plume-scales occur plentifully on the hind-wing as well as on the fore-wing. I exhibit outline sketches of hind-wing scent-scales of each of these species, together with the actual specimens from which the scales were taken.

" I have more than once drawn attention to the fact that *Belenois gidica*, Godt., diverges in some respects from the other species of *Belenois*. This is shown by the form of the male genitalia, in which the valve ends posteriorly in a blunt protuberance, in place of a spiky prolongation as in all other *Belenois*. But the scent-scale of *B. gidica* is still more abnormal among its associates. It consists of an oval lamina with a rounded and somewhat narrow distal aspect and with an accessory disc which is little more than a slight dilatation of the proximal end of the foot-stalk. There are no fimbriae such as exist in all other species of *Belenois*, but the distal margin has a beaded appearance, and sometimes shows a few minute projections which interrupt the smoothness of the marginal outline. Another Pierine assemblage with an unusual form of scent-scale is the genus *Daptonura*; where the fimbriae are minute, few and thread-like, and the club-shaped lamina tapers gradually into a foot-stalk with no trace of an accessory disc.

" In spite of this peculiarity in the nature of the scent-scales, and in spite of the not dissimilar neuration, I do not think that any close affinity can be claimed between the Old World *Belenois gidica* and the New World *Daptonura*. But it is rather remarkable that the genital valve in *Daptonura* has a posterior spine like that of *Belenois* in an exaggerated form; though curiously enough, as we have seen, *B. gidica* is the only *Belenois* without one."

Wednesday, May 4th, 1932.

Dr. H. Eltringham, F.R.S., President, in the Chair.

Obituary.

The death of Mr. J. C. Robbins, a Fellow of the Society, was announced.

Exhibits.

A long-lived Mutillid.

Mr. O. W. Richards exhibited a female of the Mutillid, *Myrmilla erythrocephala*, Latr., which had been captured by Mr. Hugh Main at Montpellier, Var, France, in May 1931. Mr. Main had kept the species alive till the autumn by feeding it on honey and water. During the winter it was fed on sugar and water, but it became weak on 8th March and died on 12th March, 1932. There is apparently no previous record of the survival of the winter by adults of this family.

Lycaenid (Liptenine) Mimetic Butterflies from L. Victoria, Uganda.

Dr. G. D. Hale Carpenter exhibited, and made the following remarks on, five species of mimetic Liptenines, taken with their models on the islands or western coast of L. Victoria.

1. *Telipna nyanza*, Neave. The specimen was captured by himself in the forest on the N.E. corner of Bugalla Isle in the Sesse Archipelago, under the impression that it was the common day-flying moth *Cartaletis forbesi*, Drc., a specimen of which was taken at the same time and place, on 11th February, 1912, between 2 and 3 p.m.

2. *Telipna sanguinea*, Plötz. This species is rarer than the first, which is sometimes not uncommon; it has a stronger reddish tint and follows the colour of *Aletis erici*, Kirb., which is often plentiful. Both model and mimic were taken on Bugalla Isle, 1912.

3. *Pentila ntebi*, B.-B. A thinly-scaled dull white species with broadly black apex to the front-wing and black border to the hind-wing. The specimen exhibited was taken at the same locality on Bugalla Isle as its model, the abundant day-flying Geometrid moth, *Geodena accra*, Swinh., on 1st June, 1912.

4. *Mimacraea poultoni*, Neave. Three forms were exhibited, taken on Bugalla Isle in February and March 1912. The species is sometimes not uncommon in the forests, and is usually of the typical rich reddish-orange colour, with a slightly paler subapical bar. This colour scheme agrees very closely with that of *Acraea sotikensis*, E. M. Sharpe, in the company of which the type specimen of *poultoni* was taken by Dr. C. A. Wiggins at Nyangori near Kisumu, Kenya Colony, at the head of the Kavirondo gulf of L. Victoria in 1903. This *Acraea* was not taken by Dr. Carpenter on the Sesse Isles, nor by Dr. Wiggins at Entebbe on the mainland coast opposite to the Sesse Isles. It occurs, however, in W. Uganda (Toro) and the Congo. *Acraea cabira*, Hpffr., is of much the same coloration, but is likewise absent from Sesse, although Dr. Wiggins found it at Entebbe, in which locality it would serve as model for *poultoni* instead of *sotikensis*, though it is of a yellower colour. For model on the islands such an *Acraea* as *bonasia alicia*, Sharpe, would serve; it is abundant and of the rich reddish-orange characteristic of *poultoni*, although of smaller size. The undersurface, however, is quite different: it is the striking radiate marginal markings on the undersurface of *poultoni* which give such a likeness to *cabira* and *sotikensis* when the wings are closed. (Eltringham's *African Mimetic Butterflies*, Plate III, figs. 21–22.) There is, however, a rare light yellow form of *poultoni* which, as Eltringham remarks, is with difficulty distinguished from a form of *Acraea viviana*, Staud., of the same colour. Now *A. viviana*, on the Sesse Isles, takes the place of *cabira* and *sotikensis*, and is usually of a yellow rather than orange colour. A specimen taken on Bugalla Isle on 9th March, 1912, was exhibited with its mimic, the light yellow form of *poultoni*, taken at the same time and place.

The third form of *poultoni* from Bugalla Isle was taken on 25th February, 1912, and is remarkable for having the orange of the hind-wing replaced by white except for a narrow margin of orange at the extreme anterior end of the white patch. There is a distinct tendency to whiteness of the anal part of the orange area in several specimens of *poultoni* taken on Mt. Elgon, eastern Uganda, by Dr. Neave in 1911, but none shows such a degree of whiteness as in the unique Bugalla specimen. It was noted on the wing that the combination of orange fore-wings and white hind-wings gave a distinct suggestion of the well-known aposeme of *Planema macarista*, E. Sharpe, ♂ and *poggei*, Dew., ♂ and ♀. It is possible that *poultoni* may produce, in time, a member of this association, the main difference being that the sub-apical and inner-marginal patches of orange on the fore-wing are separated by a black bar. This is, however, very unstable, as shown by a number of specimens from Elgon, in the Hope collection, in which this black bar is broken through at its outer end, so that there is a certain degree of continuity between the two orange areas. If this bar were to fade away completely on a specimen with white hind-wing, the result would be a good approximation to the pattern of *macarista* and *poggei*, such as has been attained by the next species on the list.

5. *Mimacraea eltringhami*, Druce. This species is a rarity, even for the genus to which it belongs. There is a specimen of the female in the Oxford Museum collected by Dr. Wiggins, and the male taken by Dr. Carpenter which has been described in the *Proceedings* (1928, **3** : p. 6). The model for this species is *Planema poggei*, but *Acraea alciope* female form *aurivillii*, Stgr., comes nearer in size; a specimen of this was taken at the same time and place as the male of the mimic.

There is a male of *eltringhami* in the British Museum, the type specimen. Coloured figures of both sexes are given in the *Ent. Mo. Mag.*, 1912, Plate IX. Attention may here be drawn to the curiously angulated outer margin of the fore-wing, which projects sharply in the neighbourhood of veins 4–5, in both sexes, quite unlike the smooth curve in *poultoni* and most other *Mimacraea*, though an approach is made by *marshalli*, Trim., and particularly its form *dohertyi*, Rthsch., mimicking forms of *D. chrysippus*, L.

Two recent additions to the Butterfly Fauna of France.

Capt. A. F. Hemming exhibited specimens of *Argynnis aphirape*, Hb., [1799] and *Lycaena amphidamas*, Esp., [1780] taken in the Pyrénées-Orientales and communicated the following notes :—

I was very much interested when I read in the Bulletin of the Entomological Society of France (1930, *Bull. Soc. ent. France*, **1930** : 243) of the discovery, by M. Deslandes, in the Department of the Pyrénées-Orientales, of *Argynnis aphirape*, Hb., and *Lycaena amphidamas*, Esp. *Argynnis aphirape*, though reported by some of the older authors as occurring in the Department of the Vosges and even in that of the Isère, has never till now been authentically recorded as having been taken in France, its nearest known stations being in Belgium (at Hockai, etc.) and in Germany (in Baden and Bavaria). *Lycaena amphidamas* is also extremely scarce in France, being confined to a few localities on the eastern frontier. The only Departments from which it is recorded are the Department of Doubs (two examples taken by M. Jeunet, formerly in the Oberthür collection and now in the British Museum) and the Department of the Bas-Rhin, where Brombacher (1921, *Int. ent. Z. Guben*, **14** : 174, 181 ; **15** : 23, 40, 62) records it as having been found several times near Weissenburg in June in damp meadows.

Both these species may be regarded as typically siberian. For both, with the exception of a few outlying stations, the Rhine had hitherto formed the western boundary. The discovery of their existence in an isolated colony at a considerable elevation (5250 feet) in the eastern Pyrenees is, therefore, of special interest, from the point of view, particularly, of insect distribution. Apart from the species now discovered by M. Deslandes, there occurs in the Pyrenees another butterfly, *Araschnia levana,* Linn., with a strikingly discontinuous area of distribution. This species is widely distributed in the northern and central Departments of France, and occurs also in the Departments of the Basses- and Hautes-Pyrénées. It has, however, never been taken in the intervening area, although it is, to all appearance, a sturdy insect, which should be able to support itself in that region. Its absence is the more surprising, when it is recalled that the food-plant of its larva is one of the most universally distributed of weeds, the common stinging nettle.

Owing to the isolated character of their locality, it is not surprising that both species discovered by M. Deslandes have developed well-marked Pyrenean subspecies. M. Deslandes confined himself in the paper referred to above to describing the characters by which these subspecies are marked. Hoping to obtain some information regarding the locality in which they occurred and the circumstances in which they were discovered, I applied for assistance to my friend M. H. Stempffer of Paris. In his reply (dated 25th March, 1932) he was kind enough to furnish some very interesting particulars. The following is an extract from his letter :—

> " . . . Je suis allé à Porté du 15 au 27 juillet 1925, tout à fait au hasard du reste, simplement en raison de l'altitude élevée. Mes chasses diurnes sont été mediocres, car pendant mon séjour, j'ai dû subir des orages quotidiens et des pluies torrentielles. Les Rhopalocères étaient rares et défraichis. Je retrouve dans mes listes de chasse :—
>
> *P. apollo, S. callidice, E. ausonia, A. euphenoides, E. oeme pyrenaea, E. stygne, E. lefebvrei pyrenaea, E. gorge, C. iphis, M. aurinia debilis, H. virgaureae, H. hippothoe, H. alciphron gordius, H. dorilis, L. boeticus, L. argyrognomon, P. argus, U. amandus, U. dorylas, C. semiargus, A. eumedon, T. baton.*
>
> Donc, rien d'extraordinaire. Par contre, à la lampe, j'avais trouvé de bonnes espèces. . . . J'ai donné mes chasses d'Heterocères à M. Boursin, qui a décrit *E. helvetina pyrenaica* (subspec. nov.) et *Calophasia lunula stempfferi* (ab. nov.).
>
> J'avais donc l'impression que la localité était interéssante et que je n'avais trouvé qu'une partie seulement de la faune. J'engageai donc mon ami M. Deslandes à y aller lui-même.
>
> Il se rendit à Porté fin juin 1930 et eut la surprise de trouver, défraichis, mais très reconnaissables, des exemplaires d'*A. aphirape* et d'*H. amphidamas.* Il m'en adressa de suite un exemplaire de chaque espèce, en me demandant de lui confirmer la détermination. Il n'y avait pas de doute. J'ai même préparé le genitalia d'*H. amphidamas.*
>
> En 1931, ni M. Deslandes, ni moi-même, nous n'étions libres en juin. Ce n'est que le 1er juillet que M. Deslandes s'installait à Porté, moi-même à Merens (Ariège) à une vingtaine de kilomètres.
>
> Malheureusement, le mois de juin avait été torride dans la région, toutes les éclosions étaient en avance et malgré nos chasses assidues, nous n'avons pu récolter que quelques *aphirape* et deux *amphidamas* en lambeaux. D'ailleurs cette dernière espèce, en raisons de ses moeurs, est très difficile à voir ; elle vole rapidement, puis se pose brusquement sur une feuille ou même sur la terre nue.

M. Deslandes connaissait l'endroit précis de ses captures de 1930 et cependant, ce n'est qu'au bout de trois heures de recherches que j'en ai trouvé deux."

At the same time, M. Stempffer was kind enough to forward a specimen of each species for my collection. In view of their exceptional interest, I give below a short note of the characters by which these new subspecies are distinguished.

Argynnis aphirape ceretanensis, Deslandes.

Argynnis aphirape ceretanensis, Deslandes 1930, Bull. Soc. ent. France, **1930** : 243. "Pyrénées-Orientales, Porté, 1600 m."

Differs from nominotypical *aphirape* in the ♂ on the upperside by the warmer tint of the ground-colour and by the accentuation of the black markings. ♀ upperside differs in the absence of the black shading and by the sharply defined character of the black markings. ♂♀ underside : colour of markings brighter; on the hindwings, especially, the brown bands contrast more vividly with the yellowish ground-colour.

Lycaena amphidamas deslandesi, nom. nov. pro.

Heodes amphidamas pyrenaica, Deslandes 1930, Bull. Soc. ent. France, **1930** : 243. "Pyrénées-Orientales, Porté, 1600 m."

Differs from nominotypical *amphidamas* in the ♂ by the reduction on the upperside of the violet scaling and by the increased size of the black spots on the forewing, which are similarly enlarged on the underside; in the ♀ on the upperside by the duller tone of the orange markings and, as in the ♂, by the increased size, both on the upperside and on the underside, of the black spots.

As *amphidamas*, Esp., is congeneric with *phlaeas*, Linn., which is the type of *Lycaena*, Fab. (1807), and as there is a species described by its author in the genus *Lycaena* under the name *pyrenaica*, viz. *Lycaena pyrenaica*, Boisduval (1840), the name *pyrenaica* proposed by M. Deslandes for the Pyrenean subspecies of *amphidamas* is invalid, since it is a secondary homonym of *pyrenaica*, Boisd. (See Article 35 of the International Rules of Zoological Nomenclature and the redraft thereof suggested by the British National Committee on Entomological Nomenclature, 1928, Article 27.) I have, therefore, the pleasure of re-naming this subspecies after its discoverer, M. Deslandes.

New and rare Insects from Windsor Forest.

Mr. H. Donisthorpe exhibited two species of *Oxypoda*, one being new to science, the other new to Britain. The first was taken by sifting damp moss in a willow swamp in Windsor Forest on 6 October, 1931, its name *salictaria* having been suggested to me by my friend Professor Poulton, as indicating a willow swamp. The swamp in question is a very good collecting ground, and we have taken over 170 species of Coleoptera there; many of them very local and rare, several of which I have also brought for exhibition. They include :—*Helophorus laticollis*, Th., which, so far as I know, has only been taken at Woking and the New Forest before; *Oxypoda nigrocincta*, Muls., which has only been taken at Yarnton near Oxford in a marshy spot, where I first discovered it new to Britain on 25 May, 1924; *Centhorhynchidius palustre*, Edmonds, taken by sweeping *Nasturtium palustre*, has only been found at Bovey Tracey, Devon, the type locality; *C. rufulus*, Dufour., chiefly found at the seaside, and almost confined to the south coast.

The second species of *Oxypoda* is *O. procerula*, Mann (*obscura*, Kr.), and I am indebted to the Windsor willow swamp for its discovery in my collection. Having taken *O. longiuscula*, Gr., there on 26 April last, I was comparing it with the series in my cabinet when I was struck by the fact that two specimens looked different from the rest. On examination under the microscope this was found to be the case, and I was able to identify it by Reitter and Ganglbauer as *O. obscura*, Kr., a species new to Britain. I find that I took both specimens in frozen moss at Cobinshaw Reservoir on 27 November, 1904, when staying with my friend Professor (now Sir T. H.) Beare in Edinburgh. The species differs from *O. longiuscula* in being a little darker, considerably more pubescent, antennae with the penultimate joints stouter and the last joint shorter, thorax broader than elytra, more convex, more evenly rounded at the sides, abdomen stouter, less tapering to the apex, etc. It is found in Central Europe, Finland, Siberia, etc.

Mr. Donisthorpe further said, "My last exhibit, the large water-bug *Ranatra linearis*, L., found in a large and ancient pond in Windsor Forest, though a local species is of course, well known, and my object in showing it is to try and describe how we saw it swimming on the top of the water. Butler describes this in his *Biology of the British Hemiptera* as follows :—'The swimming is done mainly by the hind legs, which are then moved simultaneously and with a graceful motion like that of a frog's hind legs. The intermediate legs are also moved simultaneously, but in a less rhythmical way. . . . The raptorial legs are sometimes moved vertically in the water as if to aid in progression.' But what we saw was quite different from this. The bug appeared to stand on the water in a slanting position and using the front legs like a dog swimming, and swimming with the back legs, it rushed forward, looking like a miniature motor-boat. We observed this several times; one specimen swept out and round in a great circle; another went right across the large pond in an incredibly short time, leaving a regular wave, as if from a steamboat, in its wake."

A little-known Chironomid fly (*Spaniotoma curticosta,* Edw.) captured by an Empid (*Tachydromia* sp.).

Dr. F. W. Edwards exhibited specimens of the minute Chironomid fly, *Spaniotoma curticosta*, Edw., and made the following remarks :—Instances of the capture of rare or even undescribed species by predacious insects are not uncommon, but the following example seems worth placing on record. In this case the predator is of very small size, and its prey is one of the smallest of all Diptera, so small and delicate as to be difficult to see on the wing and to require great care in collecting. *Spaniotoma* (*Smittia*) *curticosta* was recently described by me (*Trans. Ent. Soc.*, 1929, p. 364) from two males, one collected in North Wales and the other in the island of Arran. No further examples had been seen until this spring, when in the course of determining some dipterous prey of Empididae from the Oxford Museum I came across a short series of specimens (2♂ 3♀) which had been collected by Mr. A. H. Hamm at Hogley Bog, Oxford, 19.vii.1908, as prey of *Tachydromia*.

Owing to some discrepancies from the original description of *S. curticosta*, the Oxford *Spaniotoma* was at first thought to belong to a species new to Britain, but a re-examination of the types showed that they had been inaccurately described in some respects, especially as regards the colour of the halteres and antennal plume, which are not black but rather light brownish, also the costa does not end abruptly at the tip of R_{4+5} as shown in the figure, but is very slightly produced. The colour of the halteres and antennae evidently varies somewhat according to the age of the specimens, slightly immature specimens having these organs almost white. In view of these errors of the original description, and of the discovery of the hitherto unknown female, I redescribe *S. curticosta* here in more detail. The thoracic markings of the female are rather distinctive.

Spaniotoma (*Smittia*) *curticosta*, Edw.

Head blackish above. Antennae of ♂ with whitish plume, shaft not much darkened, A.R. about 0·9, tip slightly clubbed. Antennae of ♀ dark, 6-segmented, 3–5 with short, thick sense-bristles, 6 longer than 4 + 5, rather stout, with scanty but rather long pubescence. Palpi in both sexes rather long, yellowish. Eyes bare. *Thorax* in ♂ mostly dull black, with upper half of pleurae mostly yellowish, also an area around and in front of wing-base; scutellum light brownish; a small pale dot (brownish in the mature ♂, yellowish in a slightly immature ♂) in middle of mesonotum, occupying the position where the posterior end of the median stripe would be if the stripes were separate. Thorax in ♀ with ground-colour of mesonotum yellow, scutellum slightly darkened, postnotum black; three black scutal stripes which are almost completely separate, but are in contact immediately in front of the scutellum, the median stripe running whole length of scutum; included in the median black stripe just behind the middle of its length (*i.e.* in the same position as in the ♂) is a small, oval yellowish dot. Dorso-central hairs in both sexes uniserial, pale yellowish, running whole length of scutum and arising from large punctures. *Abdomen* black, except cerci of ♀, which are yellowish. Hypopygium of ♂ with short, bare anal point; coxite rather long, with small subapical lobe; style simple, somewhat square-ended, with strong terminal spine at right angles to main axis. *Legs* with femora brownish, tibiae and tarsi more or less completely pale yellowish. L.R. barely 0·6. Tibial hair in ♂ rather long and whitish. Fourth tarsal segment in ♂ over twice as long as broad and as long as fifth, in ♀ rather shorter. *Wings* rather milky, slightly brownish at tip by transmitted light; all veins white in ♂, anterior veins slightly darkened in ♀; base cuneiform, and area reduced. Venation of ♂: R_1 half as long as R_{4+5}, which ends above middle of Cu_1; R_{2+3} distinguishable, ending midway between R_1 and R_{4+5}; costa slightly produced; *fCu* far beyond *r–m*, the fork pointed at base, Cu_2 slightly bent; both Cu_1 and Cu_2 almost but not quite reaching margin; *An* not reaching *fCu*; a slight transverse fold in membrane beyond tip of *An*, as in *S. brevifurcata*, Edw. Venation of ♀ similar, but costa rather strongly produced, and R_{2+3} not clearly distinguishable (though R_1 and R_{4+5} are not fused). Halteres in ♀ whitish, in mature ♂ light brownish, base of stem darker in both sexes.

Length of body, ♂ 1·2, ♀ 1·0 mm.; wing 0·9–1 mm.

An unusual type of intersex in a Chironomid fly.

Dr. F. W. EDWARDS exhibited specimens of *Spaniotoma* (*Limnophyes*) *pumilio*, Holmgr., from Westmorland and said:—*Spaniotoma pumilio* is a northern species first found in Spitzbergen, but occurring also in Britain. In my review of the British CHIRONOMIDAE in 1929 I was able to record it from two or three localities in Scotland, but had not seen any English specimens. Last autumn, however, I found it to be abundant at Hartsop, Westmorland, many specimens being taken *in copula* on a tent roof. It was noticeable even to the naked eye that several of the females appeared to have somewhat plumose antennae, and three such specimens were captured. In normal examples of the species the male antenna has the usual plumose form found in most CHIRONOMIDAE and is composed of 13–14 segments; the female antenna is only shortly hairy and is 6-segmented (not 7-segmented as stated in my revision), with the terminal segment about half as long again as the preceding one. The three abnormal females show a marked increase in the number and length of the hairs on the antennae and also in the number of segments; one has both antennae 8-segmented, one has 9 segments in one antenna and 7 in the other, the third has 7 segments in one antenna and 6 in the other; in each case the terminal segment shows an approach to the male form, being more or less lengthened and slightly clubbed, with more than one hair-whorl.

On a previous occasion (vide *Proc. Ent. Soc.*, **6** : 40–41) I have remarked on the rather frequent occurrence of another type of intersex in CHIRONOMIDAE, in which the antennae are those of a normal female while the genitalia are those of a normal male. In some cases at least this condition is the result of parasitisation by Mermithid worms, and such specimens have never been observed to mate. The condition described in *S. pumilio* is evidently due to a different cause, and it is of interest to note that the abnormality does not affect the instinct and capacity for mating.

Occurrence of *Medetera obscura*, Zett., in Windsor Forest (Diptera, DOLICHOPODIDAE).

Dr. F. W. EDWARDS mentioned as a further instance of a rare insect occurring in Windsor Forest, that a specimen of *Medetera obscura*, Zett., had recently been received at the British Museum from that locality. A pupa of this fly was obtained from under pine bark by the late Mr. J. C. Robbins on 16 March, 1931, an adult male emerging on 13 April, 1931, the insect being submitted for determination by Mr. Robbins only a week or two before his death in April 1932. *Medetera obscura* was recorded as British by Verrall on the strength of a female taken by Col. Yerbury at Nethy Bridge in 1904, and in the British Museum collection the only specimens standing over this name were a pair taken by Dr. C. G. Lamb at the same locality in 1906. Comparison of Mr. Robbins' specimen with the male collected by Dr. Lamb showed that the two belonged to quite distinct species, and a study of the original descriptions appeared to show that while the Windsor specimen was the true *M. obscura*, the Nethy Bridge male was probably *M. signaticornis*, Lw. The Abbé O. Parent, who subsequently examined both specimens, confirmed this conclusion. If the female recorded by Verrall from Nethy Bridge was also *M. signaticornis*, the Windsor specimen is the first indubitable *M. obscura* found in Britain.* *M. obscura* is rather well distinguished from its allies by venation, the third and fourth veins running much closer together than in any other species of the genus.

Feeding experiments with Lepidoptera conducted by W. W. A. Phillips on a Ceylon Lemur.

Prof. POULTON exhibited the wings of Lepidoptera accepted or rejected by a Lemur—the only species of *Loris* in Ceylon—upon which Mr. Phillips had conducted his interesting experiments, as explained in the following extract from his letter of 6 April, 1931 :—

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* Since this was written I find that *M. obscura* has been recorded from Windsor Forest by Mr. O. W. Richards (1932, J. Ent. Soc. S. Engl. **1** : 13) from specimens reared in May 1929.—F.W.E.

" *Mousakande, Gammaduwa, Ceylon.*

" At the suggestion of Mr. G. M. Henry, Entomologist of the Colombo Museum, I am sending to you, herewith, a number of papers containing the wings of butterflies and moths that have been offered to a semi-tame Lemur (*Loris tardigradus*) that I am keeping at present. The *Loris* was caught on this estate some six months ago, and I have kept it since then in order to learn more about the diet of the species, from experimental feeding with various insects and other small fry. The wings sent herewith have been identified by Mr. Henry and you will find the identifications recorded on each paper together with my remarks as to whether the insect was accepted or not."

I am informed by my friend Mr. R. I. Pocock, F.R.S., that *Coelomys*, to which two of the insects were offered, is a " very ordinary-looking mouse with, in all probability, the habits and diet of our common field-mice. The species is doubtless *C. bicolor*, from the Southern Province, described by Oldfield Thomas."

A second set of wings was sent by Mr. Phillips on 19 May, 1931, and the results of these later experiments have been added to the earlier, each being distinguished by an asterisk. Kind help has been received from my friends Mr. C. L. Collenette, Dr. F. A. Dixey, Capt. N. D. Riley and Mr. W. H. T. Tams in settling a few questions of synonymy, etc. The wings were often imperfect and many specimens could not be sexed while the subspecific form of two Pierines remains uncertain.

The following butterflies and moths were eaten, all " eagerly " except when otherwise noted :—

Rhopalocera.

SATYRINAE : *Ypthima ceylonica*, Hew.; *Lethe drypetis*, Hew., 2 ♂ 1 ♀; **Melanitis leda*, L.; **Mycalesis subdita*, Moore, ♂.

NYMPHALINAE : *Vanessa canace haronica*, Moore; *Limenitis* (*Moduza*) *calidasa*, Moore, *same sp.; **Doleschallia bisaltide*, Cram.; **Hypolimnas bolina*, L., ♂ or ♂-like ♀; **Kallima philarchus*, Westw.; **Neptis hylas*, L., s.-sp. *varmona*, Moore.

LYCAENIDAE : *Lampides celeno tissama*, Fruhst., ♂.

PIERINAE : *Terias hecabe*, L., possibly *silhetana*, Wallace, 2 ♀, one dated 13.ii.1931; *Appias zelmira*, Cr., perhaps *Catophaga paulina*, Cr., Dry Season ♂, " eaten but not too eagerly "; *Catopsilia pomona*, F., ♀ form *catilla*, Cr., " refused at first but eaten later on "; **Nychitona xiphia*, F., " eaten."

PAPILIONINAE : *Papilio polymnestor parinda*, Moore, ♀, " eaten but not very eagerly "; **P. polytes romulus*, Cr., ♂, " eaten but not eagerly."

HESPERIDAE : **Celaenorrhinus spilothyrus*, Feld.; **Rhopalocampta benjamini*, Guér.

Heterocera.

ARCTIIDAE, LITHOSIINAE : *Philagria entella*, Cram.

NOCTUIDAE, ACRONYCTINAE : *Ancara obliterans*, Walk.

NOCTUIDAE, CATOCALINAE : *Athyrma bubo*, Hübn.; *Parallelia rigidistria*, Guér.; *Parallelia amygdalis*, Moore.

NOCTUIDAE, OPHIDERINAE : *Anomis albotibia*, Walk.; *Eumaenas salaminia*, Cr.; *Othreis ancilla*, Cr.; **O. fullonica*, L. (2); **Hypocala violacea*, Butl.

SPHINGIDAE : *Hippotion boerhaviae*, F.

Eupterotidae : *Tagora murina*, Moore.

Geometrinae : *Thinopteryx nebulosa*, Butl.; *Amblychia angeronaria*, Guén.; **Dysphania* sp. (2), apparently dark form of *bellissima*, Moore.

Lasiocampidae : *Estigmena pardalis*, Walk.

Limacodidae : *Miresa albipuncta*, Herr.-Sch.; *Scopelodes aurogrisea*, Moore.

Pyralidae, Crambinae : *Eschata xanthocera*, Hampson, " eaten."

The following butterflies and moths were labelled " refused," or words to this effect such as " will not eat," or " will not touch," etc. Any further notes are quoted.

Rhopalocera.

Danainae : *Hestia jasonia*, Westw.; *Danaida melissa musikanos*, Fruhst.; *Chittira fumata*, Butl., 2 specimens, one labelled " refused by *Loris* but eaten by *Coelomys* "; *Euploea core asela*, Moore.

Nymphalinae : *Hypolimnas bolina*, L., ♀. Compare p. 33, where a ♂ or ♂-like ♀ was " eaten eagerly." The mimetic resemblance to a *Euploea* borne by the former ♀ may explain the refusal.

Pierinae : *Delias eucharis*, Drury, ♀, " examined and thrown away."

Papilioninae : *Papilio aristolochiae ceylonicus*, Moore, " examined and thrown away "; *P. polytes romulus*, Cr. (*ceylanicus*, Fruhst.), probably ♂. " Not eaten, but as specimen was not fresh it was not a fair test." Compare p. 33, where this species was " eaten but not eagerly."

Hesperidae : **Badamia exclamationis*, F.

Heterocera.

Arctiinae : *Creatonotus gangis*, L., also *♀; *Pericallia melanopsis*, Walk., also * 2 ♂♂; *P. ricini*, F.

Lymantridae : **Euproctis digramma*, Boisd., ♀; **Lymantria grandis*, Walk., ♂.

Chalcosiinae : *Chalcosia pretiosa*, Walk., " not touched by *Loris* but eaten by *Coelomys* "; **Heterusia cingala*, Moore.

In addition to these Lepidoptera, a Tettigoniid (Locustid) *Mecopoda elongata*, L., ♀, was offered to the Lemur and " eaten greedily." Under the conditions of these experiments the mouse *Coelomys* was ready to eat insects of two specially protected groups, which were refused by the Lemur. It will be interesting to test this result by further experiments in which special attention is directed to the state of hunger or repletion of both animals.

Summarising the results on the Lemur the above statement indicates that Satyrine and Nymphaline butterflies were palatable, the one exception being the *Euploea*-like female of *H. bolina*. The Lycaenidae were only tested by a single specimen, which was accepted. The Pierinae (except *Terias* and *Nychitona*) and Papilioninae were evidently somewhat unpalatable, while two of the species were rejected, both belonging to groups—*Delias* and *Aristolochia* (*Pharmacophagus*) Swallowtails—known to be specially protected and mimicked by distantly related forms. One out of three Hesperidae was rejected, a rather surprising result. As in earlier experiments the Danaidae were unpalatable, all four species being rejected.

The results with the moths corresponded closely with previous experience, the groups with procryptic colours and behaviour being eaten, those with aposematic rejected. Interesting exceptions were the Lithosiine *Philagria* and the Geometrid *Dysphania*, the latter especially unexpected as the genus supplies models for mimicry.

Considering the results as a whole it will be realised that they provide striking evidence in support of the theories of Warning and Procryptic Coloration in Lepidoptera.

Epitriptus arthriticus, Zeller, an Asilid fly new to Britain, with Tortricid moth as prey.

Mr. B. M. Hobby exhibited a female Asilid, *Epitriptus arthriticus*, with a male Tortricid moth *Eucosma fulvana*, St., as prey. The specimens were from the bionomic collections of the Hope Department, University Museum, Oxford, and were captured on 15th July, 1907, at Merton, Norfolk, by J. H. Durrant and Lord Walsingham, who had determined the moth. The identification of the Asilid was kindly confirmed by Mr. J. E. Collin, who had pointed out that this species superficially resembled *Philonicus albiceps*, Mg., but could easily be distinguished by the fact that the tomentum of the abdomen appeared *uniformly* light when seen from in front, but showed large dark spots, of *uniform* intensity, when viewed from behind.

Further records of Sawflies and their prey (Hym., TENTHREDINIDAE).

Mr. B. M. Hobby said that the exhibited specimens of sawflies and their prey were collected by Mr. O. W. Richards and had been kindly presented by him to the Hope Department, University Museum, Oxford. All the captors were females, belonging to the genus *Tenthredella*, five species being represented. In two instances females *in copula* were taken with prey. Observations of this nature have not hitherto been recorded for the Tenthredinidae, although a number of observers have recorded similar occurrences for the Dipterous families Empididae, Asilidae and Cordyluridae. It was well established that courtship was related to predacious habits in many species of Empididae, but for the other families mentioned (including the sawflies), females *in copula* were but rarely found in possession of prey, so that it was unlikely that such occurrences could be of fundamental significance.

The prey included 7 Diptera, 3 Hymenoptera, 1 Coleopteron and 1 Hemipteron. Half the specimens were taken on Umbelliferous flowers and nearly all were small or medium-sized species. The Hymenopterous prey included two sawflies.

Mr. Hobby said that he was indebted to Mr. Richards for directing his attention to three previously published records which included as prey 1 Plecopteron, 1 Dipteron and 1 Hymenopteron. In the latter instance the attack was unsuccessful, probably owing to the hard texture of the integument.

Unless otherwise stated all specimens recorded below were taken in Bagley Wood, Berks., by Mr. O. W. Richards. Specimens marked with an asterisk were obtained on flowers of *Anthriscus*.

1. **Tenthredella temula*, Scop., ♂ and ♀ *in cop.*, ♀ with Bibionid *Dilophus* sp., ♂, 30.v.23.
2. **T. temula*, ♂ and ♀ *in cop.*, ♀ with Ceratopogonid, ♀, 30.v.23.
3. **T. temula*, ♀, with *Dilophus febrilis*, L., ♂, 30.v.23.

4. **T. temula*, ♀, with *D. febrilis*, ♂, 30.v.23.

5. **T. temula*, ♀, with *D. febrilis*, ♂, 30.v.23.

6. **T. temula*, ♀, with Aphid, 30.v.23.

7. **T. temula*, ♀, with Mordellid beetle *Anaspis* sp., ? *latipalpis*, Schil., 6.vi.23.

8. *T. livida*, L., ♀, with Tenthredinid *Blennocampa subcana*, Zadd., 7.vi.27.

9. *T. mesomelas*, L., ♀, with Ichneumonid *Exochus* sp., ♂, 29.v.26.

10. *T. mesomelas*, ♀, with Syrphid *Syrphus ribesii*, L., ♂, 29.v.26.

11. *T. schaefferi*, Kl., ♀, with Tipulid *Tipula* sp., Ferleiter, Salzburg, Austria, 8.vii.30.

12. *T. albicornis*, F., ♀, with Tenthredinid *Tenthredo arcuata*, Forst., ♀, Ferleiter, Salzburg, Austria, 2.viii.30.

13. *T.* [*Tenthredo*] *mesomelas*, L., ♀, seen trying unsuccessfully to crush the Sphegid *Nysson spinosus*, Forst., ♂, 14.vi.24 (Hamm and Richards, 1930, *Trans. Ent. Soc. Lond.*, **78** : 104).

14. *T. lineata*, Prov., ♀, with Plecopteron *Alloperla signata*, Banks, on foliage of *Heracleum lanatum*, 4.vii.07, in America (Rohwer, 1913, *Proc. Ent. Soc. Wash.*, **15** : 148. This paper also records *Tenthredo arcuata*, Forst., eating stamens of Umbelliferae in Switzerland).

15. *T.* [*Tenthredo*] *arcuata*, Forst., with *Empis* sp., Carlisle. The sawfly was on a buttercup and the *Empis* had proboscis inserted into thorax of a *Dolichopus* sp. (Murray, 1927, *Naturalist*, **1927** : 139).

Wednesday, June 1st, 1932.

Dr. H. Eltringham, F.R.S., President, in the Chair.

Election of Fellows.

The following were elected Fellows of the Society :—Hugh Trelawny Pagden, M.A., Holmstoun, West Byfleet, Surrey ; Donovan Reginald Rosevear, Forestry Department, Enugu, S. Nigeria ; André Ch. Théry, 21, Avenue de la Victoire, Rabat, Morocco.

Exhibits.

On the feeding habits and breeding of *Ochromyia* (*Bengalia*) *depressa*, R.-D., and *O. peuhi*, B. B.

The Secretary on behalf of Mr. A. M. Altson read the following :—

" Whilst examining ant-heaps in one of the paddocks of the Central Research Station, Mazabuka, Northern Rhodesia, on 29th November last year, I noticed a fly struggling with an ant for some small white object, apparently a termite worker, which the ant was carrying. I managed to capture three specimens of the fly, and identified it as belonging to the Calliphorid genus *Ochromyia*, upon which, according to Patton and Cragg, the late Mr. Howlett made similar observations for *O. jejuna*. Patton also observed the same habit in this fly in South India.

" From numerous daily observations made along the roadside and pathways and in the paddocks and garden, this fly is about from dawn till after the sun has gone below the horizon, waiting for an opportunity to seize food from various species of ants. It may be seen sitting on a blade of grass below which a stream of ant workers is moving, or on a stone, or on the ground adjacent to a stream or in the middle of it. It jumps at the food—an ant egg, larva, pupa, or captured object such as a termite worker—and impales it with its proboscis, dragging it away from the ant's grip and flies a foot or so away. Then it grips its prey with the fore legs and sucks out as much body fluid as it needs. I have never seen the fly regurgitate.

" The flies appeared after the first rains. I caught several of them, and without ants in the cages, was able to keep them alive for two or three weeks on termite workers only; these they pinioned through the dorsum of the abdomen with such power as to hold them down as they fed on the body fluids. They could even feed on dealated forms, though dragged along by the victim. To hold its prey the fly tries to grip the ground with all its tarsi. On one occasion I watched a fly take a winged termite as it came out of its guarded exit-hole and fly a few inches with it; it was, however, a very small species.

" As little appears to be known of the life-history of these flies, I seized the opportunity to work it out, after witnessing their method of oviposition, on the evening of 6th December whilst watching a Tachinid larviparous parasite of the dealated sexual termites in my garden.

" I suddenly came upon one fly digging her way backwards into a small heap of soil freshly excavated by a pair of the sexual form of a termite. The digging is done with the middle pair of legs. A few minutes later I came upon another fly with only its head and part of the thorax protruding from a similar heap. I managed to capture two of these fertilised ♀♀ and bred flies from them.

" This fly, like the larviparous Tachinid, makes no use of the soil through which a pair of termites have dug if rains—during the night—flatten the excavated heap.

" The eggs are laid in the moist soil and can hatch almost immediately; others hatched in a petri-dish on damped filter paper, about 24 to 48 hours after they were laid. Upon damping the filter paper, the eggs become covered with mucilage.

" On 7th December, 1931, two cages were prepared for the two ovipositing females. Into one cage two pairs of winged termites were put on the 7th December to burrow into the soil. The same day the fly laid some eggs. The next day the termites were still on the soil surface; they had not become dealated and had been buffeting the fly which was now lying on the soil. It was taken out to revive and later put back again. On the 12th the fly was dead. On the 16th the soil was emptied and sifted; in it was found one puparium, and one small 3rd-instar larva; of the termites, two were dead and covered with fungus, one was uninjured, of the fourth only fragments of the exoskeleton were found. The length of development in the cage, from egg to puparium was ten days.

" Into the other cage on the 7th December two pairs of dealated termites were put, and the next day three more. The fly laid 13 (?) eggs on 8th—five eggs were removed to a petri-dish to collect 1st-instar larvae and study the length of incubation. The fly was transferred to another cage the same day. On the 16th the soil was sifted and in it was found only one full-grown larva. Of the termites five were found uninjured, one was in fragments, and one dead covered with a fungus. The length of development, in this cage, from egg to full-grown larva was nine days.

" Into the cage to which the last fly was transferred on the 8th, ten pairs of winged termites had previously been put on the same day. On the 11th a pair of termites which had laid eggs in captivity were put in. On 16th the soil was sifted, and in it were found ten 3rd-instar larvae, and ten puparia, all the 22 termites being in fragments. The length of development here was also nine days. As the 10 larvae were not all apparently full-fed, they were returned to the cage and partly buried. At the same time nine termites were put in on the 16th. On the 24th the soil was sifted, and all the larvae had then pupated. Of the termites, four were uninjured, the other five were in fragments. These 20 larvae therefore accounted for 27 termites of the two largest species in this locality. This experiment proved what was not quite obvious in the other cages that the larva does not penetrate the host as a Tachinid larva would, but can seek the host through the soil and fasten on to it with its bucco-pharyngeal apparatus—a habit that the pair of hooks on a large chitinised (brown) plate just below the posterior spiracles confirms. What range the larva might have in the field is open to conjecture. It would not have very far to travel in any plane when the early swarms start, as the soil is teeming with sexual pairs. What happens when one of these larvae encounters a termite recently parasitised by the larviparous Tachinid was not studied, as the latter fly was not about when these results were obtained; only freshly emerged winged forms were used, none of which could have been parasitised by the Tachinid.

" The flies from the puparia bred in captivity began to emerge on the 27th December—21 days after the breeding experiment began—and were all out by 29th of the same month.

" The first flies appear with the first rains which also bring out the sexual forms of the termites. The first swarming termites appeared about the 15th November 1931, and from this time onwards successive broods of the flies occur. It was observed that the flies in the field can live up to about a month without ovipositing—they continue during this period to prey on ants—and it was this brood of flies I had under daily observation and began wondering whether they had an alternative host, such as a Coleopterous larva. They disappeared with the next big swarm of termites—on this occasion the grass-gathering species dominated the swarms—between the 18th to 22nd February. On the 11th March the fly was about again, *i.e.* 23 to 19 days since it disappeared. I conclude that there will therefore be one or more swarms to enable the fly to carry over through the dry season in the pupal stage till the next rains.

" It is obvious that the numbers of broods is reduced in a season of drought, a condition that correspondingly affects the flying swarms of termites.

" The first specimens of *Ochromyia peuhi*, B. B., were found on the walls of my bedroom, and on searching the house for them, seven specimens were taken. Not a day passed for weeks but there was one or more sitting on the outside walls of the house, always in the shade, usually under the eaves. At first owing to the similarity between them I mistook it for *O. depressa*, and tried feeding it on termite workers, but though it attacked them in the same way as the latter fly, it did not survive more than a couple of days in captivity. The fact that the fly behaved in a predatory manner was, however, significant.

"On the 4th January, 1932, I was fortunate enough, whilst making my daily observations on *O. depressa* along the roadside from the Laboratory to my quarters, to notice this fly on the side of road watching the stream of ant workers. On closer examination it was recognised as a specimen of *O. peuhi*. At the place where it was standing the roadside was well shaded by long grass. Unfortunately I had no time, at the moment, to watch it, but on going back a little later, I found that it had disappeared, though I concluded that it must be seizing its food from the ants and that this would consist of ant eggs, larvae, or pupae. An experiment with the object of testing this was made on 7th January when I caught two females of the fly.

"A flower-pot containing a native plant, *Blepharia longifolia*, Linden, was used. A lamp-glass was placed over the plant, and with the aid of the handle of a dissecting needle a hole was made in the soil. Into it were dropped two or three ant pupae, then a couple of ants of the species from whose nest I had dug out the supply of larvae and pupae. This arranged, both flies were released under the muslin cover into the cage. A few ant larvae and pupae were now gradually dropped inside. It was not many minutes before the ants started carrying off these immature forms, but the flies were not seen to make any movement. Later the same day two more ants were put in, and a few more larvae and pupae. Still the flies took no interest. The next day, however, the flies attacked, seizing the larva or pupa, and pulling it away from the ant worker, then flying on to the plant with it. Occasionally a termite worker was thrown in, which the ants seemed to take below. The day this experiment was started, a specimen of *O.* (*B*) *depressa*, which had been bred in captivity from the egg, was also released in this cage.

"It was not, however, till the 13th January, whilst watching *O.* (*B*) *depressa* in numbers feeding in my garden, that I obtained confirmation of the feeding habit of *O. peuhi* and came across two specimens of this fly seizing food from the ants. On the 15th, three ants were put in which were not recognised as a different species till they were inside. The next morning I discovered one specimen of *O. peuhi* had had the worst of the encounter, its dismembered body lying on the soil. This was probably the act of the new ants.

"On the 18th the ants were making the hole deeper and were carrying soil up to the surface. This done, they continued to remove the larvae and pupae supplied daily, occasionally losing one to the fly, which in this manner lived till 25th January—a period of 19 days in captivity. Its body when removed was found not to be mutilated.

"What ensued between the two species of ants was not observed, probably the original species despatched the new-comers.

"In view of the fly's habit of resting in the shade around the house all day, it seemed natural that if it wanted food it must seek some ant community working in the shade of indigenous trees. And on 8th February when making a mosquito survey in the grounds of one of the residences on the Station, I noticed specimens of the fly in the shade produced by a large *Albizzia hypoleuca* and an 'ant heap' built up against it. The tree stands within about five yards of the natives' quarters. There were three flies present, two one side and one on the other. Two of them were resting on the ant heap itself, but at a point where a recess exists between the trunk and the heap, the other stood on the trunk. These were the only specimens I noticed resting in their natural surroundings."

Rare Insects from Windsor Forest.

Mr. H. St. J. K. Donisthorpe said :—

On May 23rd last when beating hawthorn blossoms in Windsor Forest I captured a fly which Mr. Edwards informs me is *Psilota atra*, Fln., which has only heretofore been found in Britain in the New Forest.

This reminded me that I took another Dipteron, *Calliprobola speciosa*, Rossi, which was flying round an old tree in Windsor Forest on June 29th, 1931, and which also has only been found in the New Forest before. There are also a certain number of Coleoptera which are only to be found in these two localities. I am exhibiting three species, *Lymexylon navale* and *Agrilus sinuatus* which are practically confined to them, and *Eucnemis capucinus* which had only been taken in the New Forest until I discovered it in Windsor Forest in 1924.

My last exhibit consists of a new species of *Cercyon*, which I have named *C. aquatilis*, two specimens of which we fished out of a pot hole on April 26th last in the willow swamp in Windsor Forest where we have taken so many species of Coleoptera. As the shape would not do for *C. haemorrhous*, Gyll., I suspected they might be *C. marinus*, Th. (*aquaticus*, Fab.), but when set they were found to differ in many particulars—the whole insect is more closely punctured, the prosternal cavities are larger, the mesosternum is more sharply pointed at the apex; the antennae, palpi, and reflexed margins of the elytra are black, and the elytra is not evenly rounded at the apex, etc.

There are very few species of *Cercyon* found in water, and there is no other European species which will do for this new species. Specimens of *C. marinus*, Th., were exhibited for comparison.

The sex of newly emerged fleas.

Mr. H. S. Leeson said that during some work on the longevity of rat fleas (*Xenopsylla cheopis*, Roths.) females seemed more common at the beginning of the experiments and males more common towards the end. He then gave an account of four recent experiments which showed that when kept at 22° C. and 80 or 90% relative humidity females began to emerge from the cocoons on the 36th to the 40th day after the eggs were laid. In three experiments males did not appear until eight days later and in one six days later, also no more female fleas emerged after the males had started.

Experiment 1.

Commenced with 10 ♀♀ & 5 ♂♂ off mouse; fleas fed and of unknown age, placed in glass jar with bran, sand and dried powdered liver and kept at 22° C. and 80% R.H.

Days since commencement .	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	Totals.
♀♀ emerged . . .	4	3	4	1	—	—	—	—	—	—	—	—	—	—	—	—	12 ♀♀
♂♂ emerged . . .	—	—	—	—	—	—	—	—	8	11	1	2	—	—	—	2	24 ♂♂
Days . . .	1	2	3	4	5	6	7	8	9								36 fleas

Experiment 2.

Commenced with 17 larvae (from eggs laid same day) all under 24 hours old at start; placed in tube containing sand and dried powdered liver and kept at 22° C. and 90% R.H.

Days since commencement	40	41	42	43	44	45	46	47	48	49	Totals.
♀♀ emerged	7	1	—	—	2	—	—	5	—	—	15 ♀♀
♂♂ emerged	—	—	—	—	—	—	—	—	1	1	2 ♂♂
Days	1	2	3	4	5	6	7	8	9		17 fleas

Experiment 3.

Commenced with 128 eggs (all under 24 hours old) laid by 50 females in glass jar as follows:—114 on black paper, 14 on sides of jar; average per female in 24 hours, 2·5 eggs. Added to jar dried powdered liver and sand and kept at 22° C. and 80% R.H.

Days since commencement	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	Totals.
♀♀ emerged	3	3	11	12	6	—	2	1	—	—	—	—	—	—	—	38 ♀♀
♂♂ emerged	—	—	—	—	—	—	—	—	8	7	7	3	—	10	1	36 ♂♂
Days	1	2	3	4	5	6	7	8	9							74 fleas

Experiment 4.

Commenced with 112 eggs (all under 24 hours old) laid by 39 females in glass jar as follows:—84 on black paper, 28 on sides of jar; average per female in 24 hours, 2·8 eggs. Added to jar dried powdered liver and sand and kept at 22° C. and 90% R.H.

Days since commencement	36	37	38	39	40	41	42	43	44	45	46	47	48	49	Totals.
♀♀ emerged	12	8	8	7	2	—	—	—	—	—	—	—	—	—	37 ♀♀
♂♂ emerged	—	—	—	—	—	—	1	1	8	10	12	4	—	6	42 ♂♂
Days	1	2	3	4	5	6	7	8	9						79 fleas

Insects bred from a rotten oak-branch in Windsor Park.

Mr. O. W. Richards said:—On 20th March, 1932, a piece of a rotten oak-branch about 6″ long was collected from where it lay beneath an old tree. From this seven species of Diptera emerged in due course, viz.:—

Tipula flavolineata, Mg. ♂ (20.iv), ♂ (23.iv), ♂ 2 ♀ (25.iv).
Limnobia decem-maculata, L. ♀ (21.iv), ♀ (30.iv), ♀ (2.v), ♂ (5.v.), ♀ (9.v), ♀ (12.v).
Cecidomyid (undetermined). ♀♀ (22.iv, 26.iv, 2.v).
Mycomyia marginata, Mg. ♀ (6.iv).
M. ornata, Mg. ♂ (21.iv).
Oedalea holmgreni, Zett. ♂ (13.iv).
Forcipomyia nigra, Winn. ♂ (1.iv).

The larval habitat of most of these species is known already, but according to Lundbeck (1910, *Diptera Danica,* 3: 196) little is known of the early stages of *Oedalea.* He himself bred *O. flavipes,* Zett., from decaying wood.

Dr. F. W. Edwards kindly confirmed the identifications of the flies.

Insects bred from fungus in Windsor Park.

Mr. O. W. Richards also said :—On 20 March, 1932, a dead and dry specimen of the fungus, *Polyporus hispidus* (Bull.) Fr., was taken from an ash-tree. An interesting assemblage of insects was bred from it, viz. :—

Lepidoptera.	*Tinea cloacella*, Hw. 1 ♂ (11.v), 4 more specimens (16.v.).
Coleoptera.	*Orchesia micans*, Pz. Numerous specimens; the emergence not yet concluded. The first appeared on 10.v. *Cryptophagus fowleri*, Joy. One specimen 29.iv.
Hymenoptera.	*Cryptoserphus parvulus*, Nees. ♂ (11.iv), 2 ♂ 2 ♀ (14.iv), ♀ (15.iv), ♂ (16.iv). *Diaparsus gilvipes*, Grav. ♂ (25.iv). *Meteorus obfuscatus*, Nees. ♂ (16.v.), ♂ (19.v), ♀ (22.v), ♀ (25.v).

According to Kieffer (1914, *Das Tierreich*, **42** : 37), the *Cryptoserphus* is a parasite of Mycetophilid flies. Possibly at the time when the fungus was collected the hosts had already all emerged. Morley (1914, *Ichneum. brit.*, **5** : 39) records *D. gilvipes* as possibly a British insect. Marshall (1870) included it in a list of British species, but there is no definite record. On the continent it has been bred from *Hallomenus*, a close ally to *Orchesia*. The species is unusually distinct morphologically, so that the identification is probably correct. The host of the *Meteorus* is well known, and Marshall (1891, *Spec. Hymén.*, **5** : (2) : 91) states that it is a frequent parasite of *Orchesia*.

On the same date (20.iii.32) a living fungus, *Fomes fomentarius* (Linn.) Fr., was also obtained from a beech-tree. The fungus was soon attacked by mould, but before this had progressed very far a Tineid moth, *Scardia boleti*, F., emerged (♂, 25.iv).

Mr. K. G. Blair had been kind enough to identify the *Cryptophagus* and Mr. E. H. Ellis the fungi.

Mr. K. G. Blair said that he had been rearing the same species of *Orchesia* and its parasites from a large brown fungus found on an elm tree near Mill Hill in March 1932. The first insects to emerge were the Proctotrupid *Cryptoserphus parvulus*, Nees, on the 12th May and during the following week or two. This is a solitary parasite in the *Orchesia* larva, a single pupa projecting in characteristic Proctotrupid fashion from near the posterior end of the host larva. The beetles themselves had not appeared at the date of speaking (though they were found to be ready waiting in the fungus and emerged shortly afterwards). The Braconid, *Meteorus obfuscatus*, Nees, commenced to emerge early in June, from rather elongate, thin, brownish cocoons in the galleries of the beetles. The Ichneumonid, *Thersilochus orchesiae*, Morl., did not appear from this batch of fungus, though occurring with the *Meteorus* on the same host at Edgware a few years previously. *Lissonota distincta*, Bridg., recorded by Morley as perhaps from this host, had been bred by the speaker from *Tinea cloacella* from a similar fungus. With the *Orchesia* larvae in the fungus were large numbers of Staphylinid larvae which later produced *Phyllodrepa ioptera*. A single example of *Mycetophagus piceus* also appeared, and one *Cryptophagus* (unfortunately lost before being identified), but whether these beetle larvae were to any extent preying upon the *Orchesia* larvae is perhaps doubtful. The fungus was kept indoors in a room in which a gas fire was occasionally lit.

Dr. F. MORTON JONES gave a summary of his paper "Insect coloration and relative acceptability of insects to birds" illustrated by lantern slides.

Papers.

The following papers were read :—

"A Contribution to the study of the genera *Ephestia* and *Plodia*," by O. W. RICHARDS and W. S. THOMSON.

"A Revision of the Ethiopian species of the genus *Apanteles*," by D. S. WILKINSON.

"*Acraea johnstoni*, Godm., its forms, and their geographical distribution," by G. D. HALE CARPENTER.

"The British Tachinidae, 1st Supplement," by C. J. WAINWRIGHT.

"Arthropods, chiefly insects, for human consumption in Siam," by W. S. BRISTOWE.

"The butterflies of Transjordan," by A. F. HEMMING.

"Insect coloration and the relative acceptability of insects to birds," by F. MORTON JONES.

Wednesday, October 5th, 1932.

Dr. H. ELTRINGHAM, F.R.S., President, in the Chair.

Election of Fellow.

The following was elected a Fellow of the Society :—R. F. JOHNSTONE (The Royal Scots), 1st Bn. the King's African Rifles, Zomba, Nyasaland.

Obituary.

The death of Mr. C. T. BOWRING, a Fellow of the Society, was announced.

Exhibits.

Blue Stone attractive to *Cyaniris argiolus*.

Mr. H. DONISTHORPE described the observation on this subject that he had recently published, 1932, *Ent. Mon. Mag.*, **68** : 231.

Brig.-Gen. COOKE said he was able to confirm the attraction of coloured material to butterflies, and instanced the use of bright blue paper by collectors in S. America to attract various species of *Morpho*.

A ♀ of *Stenophylax dubius* and some Staphylinids new to Britain.

Mr. DONISTHORPE also exhibited a ♀ of *Stenophylax dubius*, Steph., from Windsor Forest 18.x.32, the first capture of this sex in Britain, and read a letter from Mr. Mosely on the subject.

Finally he exhibited six specimens of the Staphylinids, *Medon pectiniventris*, Donisthorpe, recently described, 1932, *Ent. Mon. Mag.*, **68** : 252, and nine specimens of *Scopoeus abbreviatus*, Dey., both new to Britain, and gave an account of the circumstances of their capture on 12th June, 1932, at Hallsands, S. Devon, in shingle.

Synaposematic association of ICHNEUMONIDAE, PSAMMOCHARIDAE and SYNTOMIDAE.

Dr. G. D. HALE CARPENTER exhibited the following specimens from the forests of the Sesse Isles of Lake Victoria :—ICHNEUMONIDAE, CRYPTINAE, MESOSTENINI, *Metarhyssa bifasciata*, Ash., 1 ♂, 1 ♀; *Cryptaulax* sp., near *formosus*, Brullé, 2 ♂♂, 3 ♀♀. PSAMMOCHARIDAE, *Pseudagenia ? spilotaenia*, Kohl, 3 ♂♂. SYNTOMIDAE, *Syntomis goodi*, Holl., ♂ and ♀ *in copula*. Also a ♀ of the Mesostenine, *Oneilella brevispicula*, Waterston, and a ♀ of the Pimpline, *Hemipimpla verticella*, Morley; and a Syrphid fly, *Baccha* sp.

Dr. Carpenter said that these Ichneumons were conspicuous insects as they ran about over leaves of the undergrowth in the forested parts of the Sesse Isles. The wings were strongly barred and tipped with black, the body was mainly black and the black antennae had a white section which attracted attention as the insect rapidly vibrated them. The *Cryptaulax* and *Metarhyssa* were extremely alike; the wing-pattern of *Oneilella* differed in that the base of the wings was dark so that there was only one non-pigmented area, near the tip; whereas in the other two the base of the wing was non-pigmented so that there were two such areas separated by a broad black bar. The black Psammocharid had the latter pattern on its fore-wings only, the tip of the hind-wings not being darkened as in the Ichneumonids, but the general resemblance to the latter was striking. The female Syntomid differed from the male by a great increase in the size of the translucent areas on the wings, and the appearance was that of transparent wings with black apex and a black transverse bar as in the Ichneumonids. Moreover the antennae had a white section, but it was terminal in the moth instead of at about the middle as in the Ichneumonid. This white section was also shown in the males. The female moth resembled the Ichneumonids, while the male did not. *Oneilella*, in addition to the difference in wing-pattern already mentioned, had more of a blue-black tint on both body and wings, and was without the red tint on the bases of the legs and the pedicel of the abdomen. The white section of the antenna was strongly marked. While coming into the same general type of coloration as that of the other two Ichneumons, it must be considered as a sub-group. The much smaller *Hemipimpla* agrees with it in having the wings mostly dark, with a pale area before the apex, and it is resembled by the Syrphid fly, an unnamed species of *Baccha*.

The resemblance between Ichneumonids, wasp, and moth, was most probably synaposematic; while the fly might be pseudaposematic, or a Batesian mimic.

Dr. Carpenter was indebted to Dr. Ch. Ferrière for the identification of the Hymenoptera; to Dr. F. W. Edwards for that of the fly; and to Mr. W. H. T. Tams for the name of the moth.

The methods adopted by Hymenoptera when filling up burrows.

Dr. G. D. HALE CARPENTER referred to an observation published by Miss Cheesman in *Hunting Insects in the South Seas*, pp. 125–126. He said that in

1930, *Trans. Ent. Soc. Lond.*, **78 :** 306, he had alluded to the habits of the SPHEGIDAE, which ram down the earth with the front of the head, and quoted an observation of Dr. R. C. L. Perkins that in the case of bees which specially close the burrows " possibly the head is sometimes used, as it is frequent to find the face with more or less clay stuck on."

Miss Cheesman's observation most happily supplied the knowledge required, and was as follows :—" In the New Hebrides is a large black bee, *Lythurgus scabrosus,* related to the Leaf-Cutter Bee. . . . It chooses dead wood which is getting rotten and soft and makes use of old beetle burrows. . . . The black *Lythurgus* does not even take much trouble in closing the entrance which one would think so very important, she just scratches together a little frass like fine sawdust from the burrow and rams that down with her jaws against the last loaf of bread."

Dr. Carpenter remarked that it was interesting to find that some of the bees, which are a group related to the Sphecoidea, made use of the same methods, as contrasted with the Vespoid PSAMMOCHARIDAE, and that just as the development of the habit had been followed in his paper, it would be interesting if it could be traced in the Apoidea. He would like to know whether any burrowing bees actually bite out portions of earth with the mandibles in the same way as Xylocopids bite out the wood.

Parthenogenesis in *Methoca ichneumonides*, Latr.

Dr. H. SCOTT, on behalf of Mr. H. T. Pagden, read the following notes :—" In 1926, *Trans. Ent. Soc.*, **1926 :** 591–597, I recorded a case of parthenogenesis in *Methoca ichneumonides* up to the point of the formation of cocoons by the parthenogenetically produced larvae. Various circumstances have prevented me from publishing further results until now.

" The parent female emerged from its cocoon in 1925, having been bred in captivity from a female taken wild at Oxshott in 1924. It laid several eggs on *Cicindela*-larvae in captivity in 1925; the larvae which hatched from these eggs developed, and the adults emerged from their cocoons in 1926. All the five offspring, parthenogenetically produced, were males and the dates of oviposition and emergence are shown in the following table :—

Date of oviposition.	Date of emergence.
1. 24.vii.1925.	14.vii.1926.
2. 24.vii.1925.	Larva died in cocoon.
3. 25.vii.1925.	12.vii.1926.
4. 29.vii.1925.	13.vii.1926.
5. 29.vii.1925.	? 17.vii.1926.

" Although No. 2 died, while still a larva, in its cocoon, the length and large size of the latter leave no doubt of the sex of the insect. No. 5 was caught by a *Cicindela*-larva which had escaped parasitism and which, although unfed for a year, had survived. The major part of the exoskeleton of the *Methoca* was recovered, but even without this the size of the cocoon would have determined the sex.

" It will be seen that the life-cycle occupies about a year in England, and this is probably usual, but Mr. G. M. Spooner, of The Laboratory, Plymouth, informs me that he had one male, reared in captivity, which completed its life-cycle the same season.

"The specimens, together with their cocoons, have been presented to the British Museum (Natural History)."

Mr. Hugh Main said he was able to confirm the statement that from the ova laid by a virgin female only males were produced (1930, *Essex Naturalist*, **23** : 67). He added that from ova deposited in 1929 by a bred and paired female a number of cocoons were obtained. In 1930 and 1931 imagines emerged and in June of this year there emerged two females, one of which was given to Mr. K. G. Blair. Ova were obtained from both specimens. Subsequently another female and a male emerged. The latter was paired with all three females, and fertilised ova were obtained from each. The delayed emergences were probably due to the cold springs of 1930 and 1931.

Mr. K. G. Blair said that he was able to carry the story a stage further. The ♀ sent to him by Mr. Main deposited six ova on six separate *Cicindela* larvae, and these produced six cocoons. After the receipt of the ♂ the pair were put together in another jar and mating at once took place. *Cicindela* larvae attacked after this were kept quite separate from those stung previously to mating, but owing to some of them developing mould, one or two being stung but no ovum deposited, and other causes, only three further cocoons were obtained. It was not anticipated that any *Methoca* would appear before next summer, so that the observer was much astonished on his return from holiday on Sept. 16th to find a ♂ *Methoca* out, but by this date dead and going mouldy, in the jar with the parthenogenetically produced cocoons. A further ♂ had appeared on the morning of the meeting. These cocoons were spun between Aug. 5th and 7th, so that the insects had spent less than two months in the cocoon instead of the normal ten months, and were the offspring of a parent that had passed three winters in that state. One of the remaining ♂ cocoons was then opened but a normal resting larva, pupation not taking place till early summer, was found within. The remaining parthenogenetic cocoons and the cocoons from eggs laid after mating were left undisturbed.

Cells, believed to be made by Mason-bees, from a torrent-bed in central Arabia.

Dr. H. Scott showed some blocks of earthen cells discovered by Major H. St. J. B. Philby, C.I.E., on Dec. 20th, 1931, at Shaib Makhan, near Riyadh, Nejd, central Arabia. The cells lay directly on the flat surface of the alluvial soil in a sandy torrent bed. They were arranged with great regularity in large flat blocks, each measuring one, two or more square feet, and several such blocks were scattered over a considerable area. Major Philby tried to bring away one block entire, but it broke up, and the pieces shown are irregular fragments, measuring a few square inches.

The individual cells are all vertical in position and circular in section, and the spaces between their earthen walls are filled with rather less solid masonry. None of the cells is more than about ½ inch deep and many are less, while all are filled with sandy earth and grit. Several cells have been cleaned out at the Natural

History Museum, but no remains of insects were found in them. Some, however, contained wisps of a fibrous substance, possibly remains of a cocoon.

Major Philby's Arab companions believed the cells to have been formed by rain or hail pitting the surface of the soil. There is little doubt, however, that they are the work of Hymenoptera, and, in general form as well as in their extremely regular arrangement, they resemble cells of the mason-bees, *Chalicodoma*, more closely than those of other mason-bees or mason-wasps. There had been a fairly recent passage of water in the *wadi*, and this had apparently carried away the upper parts of the nests and left the lower parts of the cells filled with sand. In that part of Arabia rain falls usually every year or two. But if the bees, possibly attracted by the moist and softened soil, built their nests soon after a passage of water, there would be time for the brood to develop and the adult bees to emerge, before another rush of water partly destroyed the abandoned nests. These suppositions would explain the nature of the large groups of cells and the curious situation in which they were found.

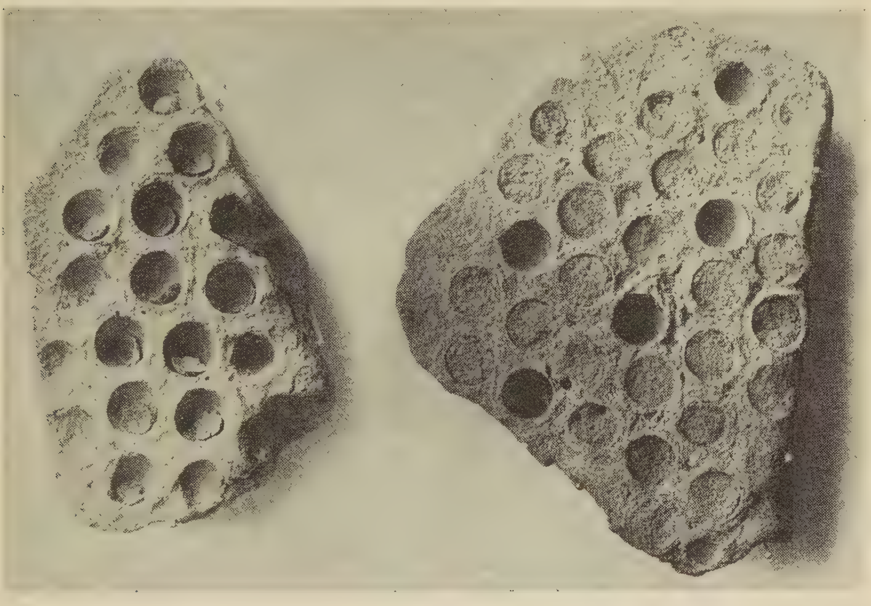

Fig. 1.—Two pieces of the earthen nests, natural size. In the smaller piece the sand has been cleaned out of the cells in which loose fragments of cocoons are visible.

It has been suggested that the cells may be fossils, made by the Hymenoptera of past ages, buried and subsequently exposed by the erosion of the torrent-bed. But their position on the surface of the alluvial soil makes it appear more likely that they are recent.

As regards the large size of the blocks of cells, in the more familiar species of *Chalicodoma*, the females are quite solitary and build their nests apart, each nest consisting of a few cells. But species are known, e.g. *Megachile* (*Chalicodoma*) *pyrenaica*, Lep., in which hundreds or thousands of females nest in colonies, and their united nests cover several square yards (Bischoff, *Biologie der Hymenopteren*, 1927, p. 239). Comstock also gives a photograph (*Introduction to Entomology*, 1925, p. 984) of a large area of wall in the Temple of Dendera, Egypt, covered with nests of *Chalicodoma*, close together or touching one another. But it is doubtful whether, in these cases, the cells are arranged with such absolute regularity over a large area as in the specimens under discussion. It is to be hoped that the identity of the species of insect responsible for their construction will be discovered.

It may be recalled that this is not the only puzzle of the kind provided by the historic countries of the Middle East, for ancient workings of insects, possibly bees, from a subterranean passage in Palestine, were exhibited by Dr. P. A. Buxton in February last (1932, *Proc. Ent. Soc. Lond.*, **7** : 2).

Major Philby has kindly presented the specimens to the British Museum (Natural History), and Mr. G. J. Arrow kindly took the photographs.

Mr. Blair expressed the opinion that the filling of the cells with sand was more probably due to wind than to water. This view raises the question whether the destruction of the upper part of the cells was caused by the rush of water, or by wind-erosion.

Mimetic associations observed among butterflies at Kitale, Kenya Colony.

Prof. Poulton said that he had received the following letter, written 7 May, 1932, from the Kapretwa Estate, Kitale, by Mr. T. H. E. Jackson, F.E.S. Observations made on the living insects under entirely natural conditions were of the greatest interest and importance, especially in relation to the problems of mimicry. Specimens illustrating the associations described by the writer were exhibited to the meeting.

" This farm is on Mt. Elgon and within fairly easy reach of the Kakamega forests; these at least are my two hunting grounds.

" I was very interested in Dr. Hale Carpenter's recent article in the 1930–31 *J. E. Afr. & Uganda Nat. Hist. Soc.*, **40–41** : 78, on *Acraea johnstoni*. Our common form up here is *confusa*, in fact I have never taken any other, and I am convinced in my own mind that it is synaposematic with *Acraea lycoa*, with which it is always in close association. I have seen them many hundreds of times flying together. *Amauris albimaculata* is sometimes common, though never in very great numbers, but it seems to prefer the thick bush or glades in the forest rather than the outside fringes where one generally finds the two Acraeas. Here on Elgon, therefore, *johnstoni* seems to be less closely associated with this Danaine than with *lycoa*.

" I came across a very interesting case of Pseudaposematism the other day in Kakamega. *Kallima ansorgei*, which was quite new to me, was obviously mimicking *Ergolis enotrea*. To look at it in the collection there seems to be no resemblance at all, but in the forest I was completely misled and stood for three or four minutes trying to make up my mind if a butterfly was *enotrea* or not! It was even mimicking that very characteristic flight, which is not its own flight at all, as I discovered when watching several more later on."

Prof. Poulton said that the mimetic association between *Acraea johnstoni*, Godm., and *A. lycoa*, Godt., had at one time led him to suggest that they were, at any rate on the slopes of Kilimanjaro, different forms of the same species (*Trans. Ent. Soc. Lond.*, **1906** : 281, pl. xxi, figs. 1*a*, 1*b*, 2*a*, &c.)—a mistaken inference corrected by his friend Dr. Eltringham in *ibid.*, **1911** : 1. It was interesting to learn that the association which was found to be so evident in the collection made by his kind friend Canon St. Aubyn Rogers, on Kilimanjaro, was equally clear on Elgon. The other association, of *Kallima ansorgei*, Rothsch., and *Ergolis enotrea*, Cram., had not been suggested before, and was considered doubtful by Dr. Carpenter and Dr. Neave. It was to be hoped that naturalists on the spot would now make a point of testing this conclusion by specially directed observations.

Further feeding experiments with Lepidoptera—also Coleoptera—conducted by W. W. A. Phillips on a Ceylon Lemur.

Prof. Poulton said that he had received the material of further experiments made by Mr. Phillips, confirming and extending the results of those recorded in 1932, *Proc. Ent. Soc. Lond.*, **7** : 32; also mentioned in *ibid.*, 1931, **6** : 51. The following letter, written 4 September, 1932, from Mousakande Group, Gammaduwa, Ceylon, accompanied the specimens :—

"I am sending to you, herewith, a few more wings, etc., of butterflies, moths and beetles, that were offered to my *Loris tardigradus* before I parted with it. I quite thought I had forwarded them to you, months ago—but apparently I had overlooked them in one of my drawers. I hope that they will not be too late to be of interest."

As with the previous record, the species had, with few exceptions, been named from the fragmentary material by Mr. G. M. Henry, of the Colombo Museum. In determining the small proportion unnamed and in settling questions of synonymy kind help had been received from Mr. K. G. Blair, Mr. C. L. Collenette, Dr. F. A. Dixey, Capt. N. D. Riley and Lord Rothschild.

The following butterflies and moths were "eaten eagerly" except when otherwise noted :—

RHOPALOCERA, Satyrinae :—*Lethe daretis*, Hew.; *Mycalesis patnia*, Moore; Nymphalinae :—*Cynthia asela*, Moore, ♀; *Atella phalantha*, Drury ("eaten"); *Hypolimnas bolina*, L., ♂ and ♀.

HETEROCERA, Sphingidae :—*Macroglossum glaucoptera*, Butl.; Noctuidae :—*Anomis* (*Cosmophila*) *fulvida*, Guén.; *Achaea mezentia*, Cram.; *Erebus macrops*, L. ("eaten greedily"); *Hypocala violacea*, Butl.; *Sericia mutabilis*, F. (*Spiredonia anops*, Guén.); Limacodidae :—*Parasa lepida*, Cram.

The following were refused with varying indications of distastefulness :—

RHOPALOCERA, Pierinae :—*Huphina nerissa*, F. ("refused"); Papilioninae :—*Papilio aristolochiae ceylonicus*, Moore ("refused : will not touch").

HETEROCERA, Arctiinae :—*Amsacta lactinea*, Cram. ("refused : thrown away"); Lymantriidae :—*Dasychira horsfieldii*, Saund. ("seized, examined and refused"); Geometridae :—*Biston bengaliaria*, Guén. ("refused").

The results of these relatively few later experiments were in striking agreement with the earlier. The acceptance of the female *bolina* tended to support the suggestion that the previous refusal (*ibid.*, **7** : 34) may have been due to the mimetic resemblance to a *Euploea* refused by the *Loris* in the same series of experiments. The refusal of the Geometrid moth, *Biston bengaliaria,* was surprising in view of the pattern which, in spite of its boldness, is apparently adapted to promote concealment upon bark.

In addition to the experiments with Lepidoptera, two beetles were offered and gave interesting and contrasted results. A large and brilliantly iridescent green Elaterid, *Campsosternus* sp., nr. *templetoni,* Westw., was " eaten eagerly," whereas the very large Buprestid, *Chrysochroa sarasinorum,* Flachs., conspicuously marked by a broad transverse belt of pale yellow, was labelled " refused : will not touch."

Recent observations on the epigamic behaviour of butterflies.

Prof. POULTON said that he had received a letter from Prof. T. Bainbrigge Fletcher, written 12 June 1932, from Hyères, and giving interesting evidence of the part played by sight in courtship :—

" I am glad to hear that the specimen of *chrysippus* was of interest to you [1932, *Proc. Ent. Soc. Lond.*, **7** : 20]. The determination of the epigamic behaviour by the sense of sight in butterflies is, of course, especially evident in the Pierids. Last month I saw four male *Pieris rapae* all chasing a female *Gonepteryx,* presumably *cleopatra,* and here one often sees *P. rapae* and other Pierids attracted to the whitish *Melanargia syllius,* Hbst., and *vice versa.*"

Prof. Poulton also wished to record the following confirmation of the observations on the remarkable courtship of *Pararge megaera* made by the late Mr. H. Rowland Brown (1918, *Entomologist,* **51** : 233) and quoted in our 1930 *Proceedings,* **5** : 101. The following account had been written from the notes taken at the time :—

The observations were made in the garden of St. Helens Cottage, St. Helens, Isle of Wight, at 4.45 p.m. (summer time), 20 August 1932—a very hot day, followed by a severe thunderstorm at night. A male *megaera* was seen continually butting the female just as described by Mr. Rowland Brown. The female was resting on the vertically cut edge of a lawn with her wings nearly open and vibrating, her head uppermost. The male was resting on the turf above, close to the edge of the little cliff, leaning over slightly in order to butt with his head the head of the female. Very little, if any, butting was performed by the latter. After delivering a rapid succession of blows the male flew off and settled with open wings a few inches away, the sex being clearly shown by the appearance. The sex of the other specimen, presumed to be a female, could not be ascertained with certainty because of its position. Therefore, although most anxious to see as much as possible of the procedure, but fearing to lose one or both, I captured the specimens exhibited to the meeting. The butterflies during the behaviour described were resting in the checkered shade of a bay tree but direct rays fell on the grass within two feet of them, or less. My attention was first attracted by the repeated movements of the male which were at first thought to be those of a butterfly caught by a flower-haunting spider.

Colour-adjustment in wild pupae.

Prof. POULTON said that it was interesting to observe the accurate adjustment of wild butterfly pupae to the surfaces which the mature larvae had selected.

He had recorded the occurrence of two very dark pupae of *Pyrameis cardui* attached to a black iron fence in our 1928 *Proceedings*, **3** : 68. Both these pupae were parasitised. During the past summer he had observed, on August 26, a pupa of *P. atalanta* hanging from the underside of the coping of the stone wall of his garden at St. Helens, Isle of Wight. The larva had evidently crossed the road from a large bed of nettles on the opposite side, and just beyond the boundary fence. The resemblance of the pupa to the grey Bembridge limestone was most striking, the effect being heightened by the iridescent metallic flecks characteristic of the species in bright, but suppressed in dark surroundings (1887, *Phil. Trans. Roy. Soc.*, **178,** B : 398, pl. 26, figs. 12, 13). The pupa was watched nearly every day until August 31 and emergence took place between this date and September 7 when the empty case was seen.

A green pupa of *P. rapae* was found, 21 September 1932, on the whitewashed wall of a building at Clovelly, N. Devon. It was freely exposed to strong light and fixed some two or three feet from the earth on which the probable food-plant, charlock, was growing. Except for a few black marks (on the prominent crest and ridges, and the sides of the rostrum), and scattered minute dots requiring a lens for their detection, the entire pupa was of a beautiful bright green colour. In this example, as with the *atalanta*, the wild pupa, or rather the larva in the pre-pupational stage, had responded to the natural conditions just as in the experiments described in *ibid.* : 408 and *Trans. Ent. Soc. Lond.*, **1892** : 437. It was shown in these papers that green pupae are produced by orange and yellow paper, and light or green pupae by white paper, the effect being probably due to the action on the larval surface, or rather that of the underlying pupa, of rays with certain wave-lengths reflected from these artificial backgrounds and also from the chlorophyll of leaves. Other rays were of course also reflected from these surfaces, especially the white paper, but the effective rays were those common to all. Blinded larvae responded to the stimulus, and other experiments also pointed to the conclusion that the colour-adjustment was brought about by the incidence of these rays upon the whole surface and not upon any organ of special sense.

The "Leopard Moth," *Zeuzera pyrina*, L., bred from Pomegranate at Malta.

Prof. POULTON exhibited a specimen of this moth with part of a branch of pomegranate containing the pupa-case and displaying the tunnels made by the larva. It had been bred in Malta, 19 June 1911, by his friend Brigadier T. D. Broughton, who had kindly presented the specimens to the Hope Collection.

Teratology in an Indian Beetle.

Mr. H. E. ANDREWES exhibited a specimen of *Nebria xanthacra*, Chaud., found by Dr. H. S. Pruthi on the banks of the lake at Nainital. This insect shows some very curious malformations, the hind femur and fourth joint of the antenna being bent almost at a right angle on both sides of the body.

Mutant larvae of *Pheosia dictaeoides*, Esp., with no yellow spiracular stripe.

Dr. E. A. COCKAYNE said "Mr. J. C. Haggart at the beginning of August found two ♂♂ and three ♀♀ of *Pheosia dictaeoides* on a rusty wire fence at Pirnmill, Arran Island, and kept two of the females for ova. One laid ova on August 4th, and he kindly sent 50 of them to me and 18 to Mr. W. L. Rudland of Reading. Unfortunately I did not observe my larvae very closely at first, but noticed that in the last two instars some were very unlike the others. These larvae had no trace of the broad yellow spiracular band, but had all the other markings of the normal larva including the yellow ventral stripe. The spiracular band was of the same medium brown colour as the area between the deep brown dorsal band and the yellow band of the normal larva, and the white-ringed spiracles were most conspicuous. My larvae were kept in tins in the dark and many of them became entangled in their own silk and died in the first two instars. Four or five died later before I noticed the unusual colour. When I did notice it I had 11 larvae with no yellow band and 14 normal ones.

"Those without the yellow band grew more slowly and were more delicate than the others. Eight normal ones went into the earth for pupation before the first dark one was full-grown. Three without the yellow band and one normal one were preserved; of the eight remaining ones without the band only one went down to pupate, but all the 13 normal ones became full-fed.

"Mr. Rudland sleeved his ova on a birch tree in the garden and on his return home found eight alive, three without the yellow band and five normal. He also noticed that those with no yellow band were slow in growing. Only one reached maturity and pupated a week after the last normal one. Of the whole brood 14 had no yellow band, 19 were normal, and 35 died young.

"Most of Mr. Haggart's larvae died in the early instars, and when I wrote to him less than a dozen survived, but amongst them were two without the yellow band. Both the dark larvae were much slower growing than the others. Mr. Horn's larvae all died young.

"I can find no record of this form in Buckler or other works. I think it must be a mutation and that the absence of the yellow band is associated with a constitutional delicacy, slow growth and liability to death before reaching the pupal stage.

"Allowing for a higher mortality in the early instars amongst the larvae without the band the figures are very close to a 1 : 1 ratio, and the form without the band is probably dominant to the normal. It is unlikely that it is recessive. It appeared in both broods and this would necessitate two pairings between a homozygous recessive and a heterozygote. It is far more probable that the two females taken close together belonged to one brood and that they were heterozygotes for a dominant gene. I had hoped to breed from one of the larvae without the band, but I am afraid it will be impossible. It is most unlikely that the unusual colour is due to environment, because my larvae were kept in tins in the dark in Scotland and Mr. Rudland's were sleeved in the open in England."

Unusually coloured larvae of *Coenotephria berberata,* Schiff.

Dr. E. A. Cockayne showed three preserved larvae of *Coenotephria berberata*, Schiff., sent from Bury St. Edmunds by Mr. Alfred Hedges. One is of the usual brown colour with darker brown markings; one has the ground-colour, head, and legs black, two white dots on the subdorsal region of the prothorax, a narrow white dorsal line on the thorax, two whitish subdorsal lines on the 7th, 8th, and

9th abdominal somites, and a narrow white ventral line; the third has a pale orange-brown head and ground-colour, with the usual dark markings of a slightly darker orange colour. The blood and fat of the brown and the black larvae were blue-green, while the blood of the orange larva was colourless and its fat was white. All three larvae were still feeding and this difference cannot be due to changes preparatory to pupation.

Wednesday, October 19th, 1932.

Mr. R. W. Lloyd, Vice-President, in the Chair.

Election of Fellow.

The following was elected a Fellow of the Society :—George H. Parry, F.L.A., Chief Librarian, Liverpool Public Libraries.

Exhibits.

Dr. L. G. Higgins exhibited and made remarks on a copy of Scopoli, " Entomologia Carniolica " 1763, including the 43 plates of which apparently only two other copies are known in this state, one in Berlin and the other in the British Museum which, however, lacks 3 tables included in the remaining copies.

Prey of *Orthetrum coerulescens*, F.

Mr. O. W. Richards said :—

At Le Trayas, Var, France, 2 Aug. '32, a female of this dragonfly was captured eating a male of the moth, *Pachycnema hippocastanaria*, Hb. The dragonfly and the moth had been kindly identified by Mr. Kimmins and Mr. Tams respectively.

Mimicry of Aculeates by an Aegeriid Moth and by Syrphid flies in the S. of France.

Mr. O. W. Richards said :—

Aegeria vespiformis, L. (*cynipiformis*, Esp.), is rather common on the French Riviera in July and August, and on the five occasions it has been captured it was three times mistaken for an Aculeate Hymenopteron. The records are as follows :—

♀. Porquerolles, Var, France, 28 Aug. '27. Caught in error for a *Polistes* or *Cerceris*.
♀. Aiguebelle, Var, France, 7 July, '31. Mistaken for a Vespid or Sphecoid.
♂. Le Trayas, Var, France, 6 Aug. '32. Recognised on the wing as an Aegeriid.
♂. Le Trayas, 7 Aug. '32. Recognised on the wing as an Aegeriid.
♂. Le Trayas, 8 Aug. '32. Caught in error for either a *Vespa* or a wasp-like Syrphid.

These notes are records of field impressions; it may be remarked that it is usually possible to identify the genus of most Sphecoids even when flying, particularly if one is familiar with the local fauna. The moths were kindly identified by Mr. Herbert Stringer.

The remarkable Syrphid fly, *Cerioides vespiformis*, Latr., is probably not rare in the S. of France. At least one specimen was recognised on the wing as a Syrphid

(♀. Le Trayas, 26 July, '32). A male, however, captured on 3 Aug. '32 was definitely mistaken for an *Odynerus*.

The resemblance between the Syrphid flies of the genus *Paragus* and small bees has often been commented on. At Agay, Var, France, 9 Aug. '32, a female of *P. bicolor*, F., flying amongst the roots of Sea Holly (*Eryngium maritimum*) was mistaken for a bee, *Prosopis variegata*, F. This bee was very common on the flowers of the Sea Holly, and the fly was at first thought to be a female bee hunting for a nesting-site. The fly has a much wider range than the bee.

On 23 July, '31, a nest of a leaf-cutting bee was found under a stone at Ailefroide, Hautes Alpes, France. This nest was preserved and on 25 June, '32, a Meloid beetle, *Zonitis nana*, Rag., ♀, emerged. The identification is due to the kindness of Dr. F. Borchmann, of Hamburg. When the beetle had emerged, the two remaining cells were opened and two dead males of the little-known bee, *Megachile pyrenaea*, Pérez, were found in their cocoons.

Attacks by birds upon butterflies, especially the DANAINAE.

Prof. POULTON drew attention to the following paragraphs in Miss Cheesman's *Hunting Insects in the South Seas*, pp. 22–3, 1932, which Commander J. J. Walker had kindly pointed out to him :—

> " The Monarch [*Danaida plexippus*, L.] is supposed to possess the same natural protection as the caterpillars, probably an acid flavour which causes the knowing ones among their natural enemies to fight shy of them; but on these islands [New Hebrides] there is at least one formidable enemy—the blue kingfisher, which is all over the group and generally to be found near the coast. I have watched this bird catch a Monarch Butterfly by a very clever swoop in the air. And at South West Bay on Malekula, in the coconut plantations where there were always numbers of this butterfly to be seen, several times I have found their torn wings on the ground among the Asclepias plants. Since there were several kingfishers haunting that locality the circumstantial evidence cannot be doubted. On one occasion, on a small knoll I estimated as many as nine butterflies must have been slaughtered. The size of the heap of torn wings was quite startling, but there were many living butterflies flying about there all day sipping nectar from the orange coloured flowers which grew in a glowing patch on the same knoll.
>
> " Such a sad tragedy is probably only of local occurrence, for this butterfly is considered as practically immune from attack by insectivorous birds, lizards and small mammals. It seems curious that, where there must be plenty of other food, any bird should cultivate a partiality for an insect which is not tolerated by other birds. But it is only corroboration of the general rule that what appears a piquant flavour to one palate may be nauseous to another."

Prof. Poulton also exhibited a male specimen of *Danaida genutia*, Cram.,* taken by his friend Mr. H. G. Champion, F.E.S., in his garden at Dehra Dun, U.P., 2000 ft. All four wings of this apparently fresh specimen were symmetrically shorn in a manner which seemed to prove that a bird's beak had been the cause of the injury. The butterfly had been captured at *Buddleia asiatica*, and was one of many uninjured specimens observed visiting the flowers of this bush.

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* For Capt. N. D. Riley's interesting and convincing discussion on the confusion between this Oriental species and the American *D. plexippus*, L., see 1928, *Trans. Ent. Soc. Lond.*, **76** : 454.

Mr. P. Lechmere Guppy had kindly written 27 May, 1932 :—

" Regarding bird-attacks on Lepidoptera, I may observe that the Jacamar (*Galbula ruficauda*) is common in Tobago, and may often be seen sitting with its mate on roadside hedges, looking out for insects, mostly butterflies and moths, disturbed by passing vehicles or persons. The birds take them on the wing, flying back to their perch to finish their meal. I have seen the Jacamar snapping up the Hesperid butterflies as they came to the flowers in a garden.

" *Pitangus sulphuratus* (the Kiskadee) will eat anything—Capsicum, potatoes, lizards, moths (e.g. *Castnia licus*), beetles, &c. It is common, noisy, and always with us round the house, at St. Ann's, Trinidad. Strange to say this bird does not occur in Tobago, this island being only about twenty miles from the nearest point in Trinidad."

Further evidence of nesting associations between Neotropical birds and wasps.

Prof. POULTON said that the following interesting observation is recorded in his friend Major R. W. G. Hingston's recently published *Naturalist in the Guiana Forest*, pp. 331, 332.

After describing the cacique's hanging, purse-shaped nests made of dry grass and fibre interwoven with sticks, the author states " that the birds select a tree for their nests which is already occupied by colonies of wasps. One sees the nests of wasp and bird in close proximity on the same branch. It is fairly obvious that the birds select such trees in order to gain still better protection. It is probable that monkeys, snakes and other arboreal creatures would not dare to enter trees already occupied by a swarm of wasps. The yellow-backed cacique sometimes hangs its nest almost touching the habitations of the wasps. The wasps enter and leave their home without molesting the birds in any way, and one naturally wonders what benefit they receive that permits their toleration of such noisy companions. The instinct of these birds to nest in a colony is itself a protective impulse. It greatly increases their power of attack. When an enemy appears the whole colony can make a combined and vigorous assault."

His friend Mr. A. H. Hamm, A.L.S., had called his attention to a passage in Eugène André's *Naturalist in the Guianas* (T. Nelson, London, N.D., revised, pp. 280–1). The observations were made in April, 1901, the islands referred to being in an affluent of the Orinoco, the Caura which takes the name of Merevari above the point where the Erewato falls into it.

" The trees on the islands were in many instances used by colonies of hang-nests, who were rearing their young at the time of our visit; in fact, some of the trees were literally covered with nests placed so close together that it would be impossible to find room for an additional one. The biggest colonies were those of the yellow cassique [*Cassicus albirostris*] and the scarlet-backed cassique [*C. haemorrhous*]. It is a curious fact that these birds almost always hang their nests in close proximity to the hives of the marabunta.

"There must be some understanding between the birds and these terrible insects, for the hives and nests are sometimes so close together that the birds, on the frequent visits they make to their young, brush past the marabunta homes without in the least perturbing their owners, who are noted for the violence with which they resent an intrusion they do not approve of. There is moreover a good deal of resemblance between the nests and the hives."

The nest of a "Marabunta"—a general S. American term for common, social, aggressive Vespidae nesting in trees—was figured by Major Hingston (*ibid.*, opposite p. 78). These two published records form an interesting addition to the numerous authors quoted by Dr. J. G. Myers in our *Proceedings* for 1929 (**4** : 88).

Indian Myrmeleonidae observed hawking prey like dragonflies, by H. G. Champion.

Prof. Poulton exhibited two examples of *Formicaleo gravis*, Walk., and the moths which they were devouring, sent to him from Dehra Dun by his friend Mr. Champion, together with the following note :—

"An Antlion was often to be seen hawking round the bush [*Buddleia asiatica*], two being netted with their prey [the Noctuid moths, *Chalciope hippasia*, Cram., ♂ (Catocalinae), and *Iniselia consanguis*, Guen., ♀ (Hadeninae)]. They are extremely voracious and very quickly eat the body of a moth, beginning with the head and working backwards. At the same time, feeding or passing moths did not seem to take any notice of the proximity of the antlions."

In the determination of the Myrmeleonids and the moths he had been kindly helped by his friends Mr. D. E. Kimmins and Mr. W. H. T. Tams. The predacious habits of antlions in the imago state appeared to be very little known and it was hoped that the facts recorded by Mr. Champion would lead to further observations.

Pyrameis cardui, L., observed flying at midnight, between Madeira and Bathurst.

Prof. Poulton said that he had just received the following interesting letter written, 4 October 1932, by Sir Donald Kingdon. He had replied to his friend asking if he would kindly send the specimens in order that they may be studied and the proportions of the sexes determined.

"I think you will be interested to hear that recently on the voyage out from England a number of 'Painted Ladies' came on board at night.

"I was on the motor vessel 'Accra' and we were on the way from Madeira to Bathurst, on the evening of the 28th Sept. I first noticed the butterflies about midnight and they must have come on board during the previous hour. Our position at midnight was lat. 17° 47′ N., long. 17° 35′ W., and the distance from the nearest land was 87 miles. There was, and had been all day, a strong off-shore wind.

"The insects were flying round the lamp on deck and some settling in dark corners. I captured and have with me now all I could take—viz. twelve. Next day I heard of many others—in people's cabins and so on. Of the twelve, some are quite good specimens and some are very battered. If you would like all or any of them for the Oxford Museum, I shall be delighted to send them to you.

"I may mention that here, in Sierra Leone, I find the same butterfly on the wing

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MEETINGS

TO BE HELD IN THE SOCIETY'S ROOMS

41, Queen's Gate, S.W. 7

1933.

Wednesday,	January (Annual Meeting)	18
,,	February	1
,,	March	1
,,	,, ...	15
,,	April	5
,,	May (Centenary Meeting)	3
,,	June	7

The Chair will be taken at Eight o'clock.

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